



US009637033B2

(12) **United States Patent**
Fujita et al.

(10) **Patent No.:** **US 9,637,033 B2**

(45) **Date of Patent:** **May 2, 2017**

(54) **LIFTER MECHANISM AND VEHICLE SEAT**

(71) Applicant: **Delta Tooling Co., Ltd.**, Hiroshima-shi (JP)

(72) Inventors: **Etsunori Fujita**, Higashihiroshima (JP);
Yumi Ogura, Higashihiroshima (JP);
Seiji Kawasaki, Higashihiroshima (JP);
Katsuhiro Inoue, Hiroshima (JP); **Eiji Sugimoto**, Higashihiroshima (JP);
Minoru Nakamura, Hiroshima (JP);
Ryuji Kuwano, Hiroshima (JP);
Atsushi Nishida, Hiroshima (JP)

(73) Assignee: **DELTA TOOLING CO., LTD.**, Hiroshima-shi (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/905,195**

(22) PCT Filed: **Jul. 11, 2014**

(86) PCT No.: **PCT/JP2014/068639**

§ 371 (c)(1),

(2) Date: **Jan. 14, 2016**

(87) PCT Pub. No.: **WO2015/008713**

PCT Pub. Date: **Jan. 22, 2015**

(65) **Prior Publication Data**

US 2016/0176325 A1 Jun. 23, 2016

(30) **Foreign Application Priority Data**

Jul. 14, 2013 (JP) 2013-147144

Dec. 7, 2013 (JP) 2013-253711

(51) **Int. Cl.**

A47C 1/00 (2006.01)

B60N 2/50 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **B60N 2/501** (2013.01); **B60N 2/06** (2013.01); **B60N 2/165** (2013.01); **B60N 2/166** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC **B60N 2/06**; **B60N 2/165**; **B60N 1/1615**
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,556,185 A * 12/1985 Takagi **B60N 2/045**
248/421

6,264,275 B1 * 7/2001 Frohnhaus **B60N 2/165**
297/344.12

(Continued)

FOREIGN PATENT DOCUMENTS

JP 60-164439 U 10/1985
JP 10-100757 A 4/1998
JP 11 99857 A 4/1999

OTHER PUBLICATIONS

International Search Report Issued Sep. 30, 2014 in PCT/JP14/068639 Filed Jul. 11, 2014.

Primary Examiner — Laurie K Cranmer

(74) *Attorney, Agent, or Firm* — Oblon, McClelland, Maier & Neustadt, L.L.P.

(57) **ABSTRACT**

A neck injury is improved with a structure having a lifting mechanism part only on one side. While a lifting driving part is provided on a side of one side frame, a coupling driving rod is coupled to a rotation center of a drive gear a driving link is disposed on a side of the other side frame, and the driving link is coupled to the coupling driving rod. A driving force in the lifting driving part operates on the side of one side frame having the drive gear, but on the side of the other side frame, the driving link rotates together with the drive gear via the coupling driving rod, so as to perform a lifting

(Continued)

